AMENDMENTS TO THE SPECIFICATION

Please insert the following new paragraphs after the title:

Cross-Reference to Related Applications

This application is related to, and claims the benefit of, the provisional patent application entitled "Apparatus and Method for an enhanced Reading Device With Automatic Line Registration", filed November 26, 2002, bearing U.S. Ser. No. 60/429,196 and naming Eric Bradbery, the named inventor herein, as sole inventor, the contents of which is specifically incorporated by reference herein in its entirety.

Please amend paragraph [0005] as follows:

A substantial number of individuals suffer from a variety of vision impairments which impairs their ability to conveniently read. One ailment in particular, macular degeneration, afflicts many individuals as they age. Macular degeneration results in the loss of central vision which directly impacts an individual's ability to read, since the reader must rely on peripheral vision. Typically, an individual with macular degeneration uses a magnifying glass to enlarge the written words to so that they can be more easily perceived. However, magnifying glasses have limitations on their ability to enlarge characters. Likewise, moving a magnifying glass across the written line often results in inadvertently moving to the wrong line when the reader steps from line to line. It would be desirable to have a method of enlarging characters beyond the scope of the conventional magnifying glass, and the method of stepping from line to line without losing [[ones]] <u>one's</u> place in the document.

Please amend paragraph [0007] as follows:

The present invention provides an enhanced reading device that which secures written material in a fixed location and dynamically moves the optical reader across the written text for the purpose of automatically registering the optical reader at the beginning of each new line. The device uses a manually operated transmission to move a camera across a line, and to step the camera to the next line when appropriate. Optional embodiments permit the transmission to be powered and ~~control~~ controlled by push buttons for automatic registration at the beginning of new lines. The device also has an integral elevator assembly to move the document closer or farther away from the television camera for the user's convenience. The elevator device uses a threaded rod to move the document tray vertically. In addition, the document tray is supported by side support arms. The elevator can also be optionally powered rather than manually operated.

Please amend paragraph [0016] as follows:

Figure 9 illustrates another preferred embodiment of the multifunction knob and gear drive assembly which uses [[the]] a chain drive.

Please amend paragraph [0025] as follows:

Prior to a detailed discussion of the figures, a general overview of the system will be presented. Enhanced reading devices have been developed to assist individuals with severe vision problems. For example, individuals with macular degeneration have substantially degraded central vision and are unable to read normal sized text. Likewise, there are numerous other vision impairments (e.g., corio-retinitus, physical injuries, etc.) which also substantially reduce an ~~individual□s~~ individual's ability to read normal text.

Please amend paragraph [0026] as follows:

The prior art has provided a number of devices to assist individuals with vision impairments. An early attempt to help individuals with vision impairment has been to provide a document viewer, similar in structure to those used for microfiche, which have a movable tray to hold text material. An optical lens and lamp assembly is provided to project an enlarged image of the document text onto the ~~viewer□s~~ viewer's screen. The individual moves the tray manually from line to line in order to read the enlarged text on the viewer screen. Alternatively, the document can be placed in a fixed position and the optical lens and lamp assembly can be moved over the document.

Please amend paragraph [0029] as follows:

These prior art embodiments have a significant drawback in that they are manually operated devices which require the individual to move either the document or a camera from place to place on the document. Due to erratic movement caused by manual operation, in combination with the enlarged image which the user uses to guide movement of the device, the image used by the individual is visually irritating and is prone to mistakes due to the fact that the individual may move more than one line at a time and waste substantial time during the alignment process in order to finish reading a document. In addition, high-end computer systems are not available to many individuals due to cost, or due to an ~~individual□s~~ individual's lack of expertise with computers. This invention improves upon all the foregoing by providing a low-cost, easy-to-use system, which requires a minimum of processing power (without the need for a complete computer), which requires no computer knowledge, and can use the ~~individual□s~~ individual's conventional television in place of a computer monitor.

Please amend paragraph [0033] as follows:

The preferred embodiment also uses a mechanical drive system to illustrate the ability of the invention to precisely move the camera from line to line, and also to register the camera at the beginning of line. This is possible because the document being read can be placed on its support tray and not moved. Since the only part of the visual system which is moving is the camera, and not the source text, then the device can control movement of the camera such that it does not slide from line to line as is often the case for manual camera displays. The inadvertent sliding across lines happens because the individual is not able to precisely control the camera when it is handheld. This is also true for devices which would use a fixed camera and a slidable tray. A manually slidable tray will have the same problems that a manually held camera will. Namely it relies on the precision of the individual as the ~~individual□s~~ individual's hand moves the device in question. This eliminates a substantial amount of fatigue because the individual does not have to carefully monitor the screen to make sure that the camera is not sliding from line to line. Instead, the camera can be operated such that moves in only one axis at a time, thereby ensuring that it does not skip lines. While the mechanical drive, discussed in the specification accomplishes this controlled single axis motion, those skilled in the art will recognize that the invention can also be implemented electronically.

Please amend paragraph [0039] as follows:

In the situation where an electronic drive is used, the determination of where lines begin and end can be implemented in several ways. The simplest method is to use movable tabs to indicate the beginning and the end of the lines. This can also be implemented in a manually operated embodiment [[of]]. A simple mechanical implementation of this device would be to use two adjustable mechanical keys to indicate the beginning and the end of a line in the same manner as mechanical keys are used on conventional typewriters. In this embodiment, when the individual places the document on the document support tray [[10]] 2, the individual moves the mechanical keys such that they provide stops at the beginning and at the end of a line of text. When the camera assembly drive 8 detects that it has reached a mechanical key which indicates a line end, it could automatically reverse direction (~~afetr~~ after a suitable time period) and return to the beginning of a line. Preferably, the individual would command it to reverse direction to ensure that the individual has time to read the text at the end of the line. The camera assembly drive [[10]] 8 would recognize when it reached the beginning of the line when it detected the mechanical key which was set up for that purpose. At the same time that the camera assembly drive [[10]] 8 was returning the camera assembly 7 to the beginning of the text line, the longitudinal support 4 advances from the top of the document 9 towards the bottom of the document 9 in single line steps under control of the longitudinal support drive 5. The distance between lines may also be set as mechanical adjustment by the user when the document is first placed in machine. Adjustable mechanical line indexing is well-known the typewriter arts and can be implemented here as a mechanical solution as well.

Please amend paragraph [0043] as follows:

In addition to determining the longitudinal location of lines, and the lateral beginning and end points of individual lines, provision is also made for automatic adjustment of focusing. Those skilled in the art will recognize that the camera assembly 7 can be made more inexpensively if the camera assembly 7 is manually focused by the individual to allow for thickness changes in the document 9. Due to differences in thickness, focus adjustments may be necessary to ensure a clear picture on the monitor 14. While cost considerations are important, the preferred embodiment envisions a camera assembly 7 with automatic focusing capability. Automatic focus adjustment can be extremely valuable in a situation where a document 9 has a non-flat surface, such as a book, and has pages which bend due to the ~~book□s~~ book's binding structure. The bending in each page of an open book causes each line to vary in its distance from the camera. As a result, automatic focus adjustment allows the camera to dynamically focus on words within a line as the distance is constantly changing between the camera lens and the page surface. Automatic focus adjustment is well-known in the camera arts and need not be discussed further herein.

Please amend paragraph [0044] as follows:

Once the document 9 has been inserted, the position and starting point of the textual data has been determined, and the focus has been adjusted, the individual can begin reading. In the preferred embodiment, the individual controls movement of the camera across the text line to suit the ~~individual□s~~ individual's personal reading speed. In addition, the individual also has the ability to control movement of the camera assembly 7 to the next line. Backspace capability is also provided to accommodate a reader who wishes to review an item of text. All of these controls are implemented via input device 16. Other optional features can also be included. For example, if the individual is reading the document 9 which has several independent articles, the system can also be set up to recognize paragraph breaks. This is relatively easy to accomplish since paragraph breaks usually are indicated by an extra line space, or by indented text at the beginning of the paragraph. The ability to recognize paragraph break can be easily implemented by looking for extended spacing between lines, and/or the appearance of an indented sentence beginning. By giving the individual the ability to step from one paragraph to another, the individual can rapidly and conveniently step through articles to reach the article of interest.

Please amend paragraph [0053] as follows:

In the preferred embodiment, a simple mechanical lever invention is used to raise and lower the document support tray 2. However, those skilled in the art will realize that there are a variety of methods which can be used to change the distance between the document lifting mechanism 1 0 and the document support tray 2. For example, a gear driven lift can be used, a pulley based lift can be used, a hydraulic lift can be used, a ~~□scissor□~~ scissor type lift can be used, a cam lift can be used, etc. Therefore, the exact type of lift mechanism can vary. The only requirement is that the lift mechanism be suitable for conveniently raising or lowering the document support tray 9 in relation to the camera assembly 7.

Please amend paragraph [0054] as follows:

Figure 4 is another alternative preferred embodiment of the enhanced viewing device 1. This embodiment includes the document support tray 2, a camera assembly 7, and the side supports 3, as discussed in regard to the previous embodiments. In addition, it includes a lifting mechanism 10 for the document support tray 2 as discussed above in regard to figure 3. This embodiment differs from the previous embodiments in that it includes a manually operable longitudinal support drive 12, and a manually operable lateral camera assembly drive 13. The advantage of the manually operable drives for the longitudinal support 4 and that camera assembly 7 is that the cost associated with implementing the invention can be substantially reduced. However, the disadvantage associated with this embodiment is that a portion of the automation of the system is lost. The advantage of this embodiment over the prior art is that once the individual sets [[to]] the line start point and the line and point, the camera assembly 7 can be moved across the length of text line on the document 9 without requiring the individual to carefully watch the monitor 14. While the individual can manually move the camera assembly 7 until it rests above the beginning of a line of text, it is preferred to have a mechanical key, such as that discussed above, to allow the individual to more quickly and easily find the beginning of line.

Please amend paragraph [0055] as follows:

Regarding manual movement of the lateral support 4, it is preferred to use a line indexing device (not shown), such as that used on typewriters. The line indexing device permits the individual to step from one line to the next without having to carefully watch the monitor 14 to see the next line of text is reached. As a result, with the use of proper line start/line stop mechanical keys in combination with a line indexing device provides an individual with the ability to quickly and accurately step from the end of one line to the beginning of the next line without having to worry about errors created by variances in motion of the camera assembly 7 caused by the ~~individual□s~~ individual's hand motion. Even though this embodiment requires more work on the part of the individual, it still improves over the prior art devices which rely on the individual to move the camera assembly 7.

Please amend paragraph [0057] as follows:

The processor 15 is referred to as a ~~□processor□~~ processor for ease of discussion. However, while it can be implemented by a complete microprocessor, such as those used on personal computers, it can also be implemented by a much more limited function microprocessor or controller, or even a pre-programmed device such as an EEPROM. Likewise, the processor 15 and the input device 16 are illustrated as separate devices. However, as a practical matter they can both be integrated into the enhanced reading device 1 such that the enhanced reading device 1 has a single video output cable which attaches to the monitor (i.e., television) 14 and a single power input cable (not shown).

Please amend paragraph [0058] as follows:

Also shown in this figure is input device 16 which is used to provide instructions from the individual to the enhanced reading device 1 via processor [[16]] 15. For example, the individual can enter commands to cause the camera assembly 7 to skip from paragraph to paragraph, the individual can enter commands to cause the camera assembly 7 to move to the next line, the individual can enter commands to cause the camera assembly to backspace for the purpose of allowing the individual [[for]] to review an item previously read, the individual can enter commands to [[to]] set parameters such as line start position, line end position, line spacing, etc., and the individual can also enter commands to control other functions such as motion of the document lifting mechanism 10, etc. The input device 16 can be implemented by any suitable device, such as a conventional computer keyboard, a smaller limited function keyboard, or even a simple device such as a computer mouse.

Please amend paragraph [0061] as follows:

Once the individual reaches the end of the print line, the knob 19 is merely rotated a half turn back to accurately return the camera 7 to the beginning of the text line. At the same time, push button 20 is pushed to index the lateral camera ~~support~~ assembly support 6 such that the camera 7 is positioned above the next line of text. As a result, by simply rotating the knob 19 and pressing its integrated push button 20, the camera 7 is positioned at the beginning of the next line of text. This is a substantial improvement of the prior art in that the automatic positioning of the camera 7 eliminates ~~the high~~ eye fatigue. This ~~high-level~~ eye fatigue is caused by the need for individuals to carefully watch the camera 7 output as it rapidly scans back to the beginning of the line to avoid inadvertent line skipping. Once the ~~camera□s return~~ camera returns to the beginning of the line, then the individual must search for the next line. This effort is greatly reduced by the invention in that the line returns do not have to be carefully monitored. In addition, the unique mechanical structure provided herein allows the individual to position the camera 7 with a minimal amount of physical effort, and only requires the individual to use one hand.

Please amend paragraph [0065] as follows:

Also shown in this figure is push button 20. In the preferred embodiment, push button 20 is spring loaded to hold it when not in use in a disengaged position. During use, the individual would rotate knob 19 to move the camera 7 across a line of printed text. When the individual wants to read the next line, the knob 19 is rotated back to the beginning of the line and push button 20 is pressed. When push button 20 is pressed, it moves inward and contacts lever 31. Lever 31 is attached to pivot point 32. When it is moved by push button 20, it pivots about pivot point 32 and rotates ratchet assembly 34 which in turn moves the lateral camera ~~support~~ assembly support 6 longitudinally to advance to the next line to be read. Ratchet assemblies are well known in the art and can be implemented in a variety of ways, such as using two gears, pulleys, etc., and do not have to be discussed in further detail here.

Please amend paragraph [0067] as follows:

An advantage of this embodiment is that the individual can control movement of the camera without moving the ~~individual□s~~ individual's arm. Rather, the arm can be placed in a comfortable position and the camera 7 can be moved with a minimal amount of effort. Another advantage is that this invention can be implemented in an entirely mechanical fashion, such that it is extremely economical to manufacture, requires no electrical power other than that used by the camera 7 itself.

Please amend paragraph [0069] as follows:

For ease of discussion, the various embodiments of the invention have shown the multifunction (i.e., the term ~~multifunction~~ "multifunction" is used because a single knob can be used to control both lateral and longitudinal motion of the camera 7) knob 19 disposed on the side of the enhanced reading device 1. However, those skilled in the art will recognize that it is a simple matter to move the multifunction knob 19 to the front of the enhanced reading device 1, by way of a few mechanical adjustments. Therefore, it is understood that the invention does not restrict the location of the multifunction knob 19, as illustrated in the figures and discussed in the specification, to any specific location on the enhanced reading device 1.

Please amend paragraph [0070] as follows:

In figure 10, a top perspective view of another preferred embodiment of the enhanced reading device 1 is illustrated. This figure illustrates the position of the camera 7 and its lateral camera assembly support 6 in relation to the document support tray 2. The lateral camera assembly support 6 moves ~~from word~~ forward and backward to step the camera 7 from line to line. This is accomplished by a manually controlled transmission assembly that consists of a transmission control [[of]] 42 that is attached [[to]] via transmission rod 43 to gears 44 and 68 (gear 68 is shown below in figure 14). Transmission rod 43 is supported by proximal bracket [[to]] 72 and distal bracket 45.

Please amend paragraph [0071] as follows:

Longitudinal motion of the camera 7 is controlled as follows: gear 68 controls rotation of longitudinal motion shaft 48 which drives longitudinal drive belts 53 to control longitudinal motion of the lateral camera assembly support 6. When longitudinal drive belts 53 are moved under control of longitudinal motion shaft 48, they move the lateral camera assembly support 6 which is attached via ~~bracket□s~~ brackets 56, clamps 57 (which are attached to longitudinal drive belts 53) and mounting screws 58 (which attach bracket 56 to lateral camera assembly support 6). This figure also illustrates wheels 59 which are used to move the lateral camera assembly support 6 longitudinally with a minimum amount of friction. Of course, a simple greased slider can also be used. However, that would result in increased friction and require more force to move the lateral camera assembly support 6.

Please amend paragraph [0072] as follows:

Lateral motion of the camera 7 is controlled as follows: gear 44 controls motion of gear 46 which is attached to gear 49 via rod 47. Rotation of gear 49 controls rotation of lateral drives belt 52 which in turn causes lateral motion of the camera 7 inside of the lateral camera assembly support 6. For ease of illustration, the camera 7 is illustrated as being attached via a bracket 8 outside of the lateral camera assembly support 6. However, it may be preferable to mount the camera 7 between the rails which comprise the lateral camera assembly support 6 for the purpose of balancing weight and reducing friction. Likewise, the lateral drive belt 52 can be mounted between the rails, as shown, or outside of the real assembly. In addition, those skilled in the art will recognize that the lateral drive belt 52 can be eliminated ~~in replace via~~ and replaced with a worm gear or a chain drive. As was the case above, [[and]] in regard to longitudinal motion, the lateral motion [[to]] of the camera can also be made easier through the use of wheeled mounts rather than a slider as was discussed in previous embodiments.

Please amend paragraph [0073] as follows:

Optional transparent plate [[72, a]] 73 is shown resting on top of the document support tray 2. ~~Transparently 72~~ Transparent plate 73 is used to flatten the paper document to allow the camera 7 to be more easily focused. It can be manufactured from any transparent material, such as glass, Lucite, Lexan, etc. Non-glass materials are preferred for fabrication of the transparent plate [[72]] 73 because they resist breakage better than glass.

Please amend paragraph [0076] as follows:

In regard to figure 11, this figure illustrates a front orthogonal view of a preferred embodiment of the enhanced reading device 1. This figure ~~for other~~ also illustrates the belt drive and roller assembly used to transport the camera 7 over the document support tray 2. In particular, the lateral camera assembly support 6 slides on wheels 59 along tracks 21. Wheels 59 are preferred because they provide the minimum amount of friction and require the least amount force to longitudinally move the lateral camera assembly support 6. Also shown in this figure are bracket assemblies 56 which attach to longitudinal drive belts 53 via clamps 57. Bracket assemblies 56 also attached to lateral camera assembly support 6 such that movement of the longitudinal drive belts 53 causes longitudinal movement of the lateral camera assembly support 6.

Please amend paragraph [0083] as follows:

In figure 17, a left cut away view of a preferred embodiment of the enhanced reading device 1 is illustrated. This figure illustrates how the document support tray lift arms 62 are used to control vertical motion of the document support tray 2. In a preferred embodiment, two lift document support tray lift arms 62 are used because they provide more stable motion of the document support tray 2. However, those skilled in the art will recognize that a single document support tray lift arm 62 embodiment can also be implemented. As discussed above, movement of the support tray 10 causes the lower pivot points of the support arms 66 to move to the rear of the enhanced reading device 1. This causes the side support bars 66 to move towards a more vertical orientation which causes the document support tray 2 to move upwards. As noted, movement of the support tray 10 is controlled by rotation of the threaded rod 69 under control of height control knob 11. In addition, the threaded rod 69 is also attached to the document support tray lift arm 62 via sleeve 70. When the threaded rod 69 is rotated, the document support tray lift arms 62 rotate about pivot point 63. Rotation of the threaded rod 69 causes the sleeve 70 to move longitudinally. In addition sleeve 70 is also attached to a slider rod 71 that moves along a longitudinal track to control movement of the support tray lift ~~arm□s~~ arms 62. The sleeve 70 is attached to the slider rod 71 via a slot to allow the sleeve 70 to move freely. While the lower ends of the document support tray lift arms 62 are attached to the sleeve 70, the upper ends of the document tray lift arm 62 are in contact with the document support tray 2 and provide an upward lifting force which is controlled by rotation of the threaded rod 69 under control the height control knob 11.